Information technology governance by design

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INFORMATION TECHNOLOGY GOVERNANCE BY DESIGN: INVESTIGATING HYBRID CONFIGURATIONS AND INTEGRATION MECHANISMS

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Abstract

This study aims to enrich and expand the conceptualization of IT governance by identifying the diversity of hybrid configurations and integration mechanisms and exploring the IT performance effects. While literature describes the prevailing configurations for formally allocating IT decision-making authority, previous studies have not addressed the complexity of hybrid configurations, the required integration mechanisms, and the associated performance effects. Building forth on organization theory, a conceptual framework is developed for conducting multiple comparative case study research in the financial services industry. The findings indicate that as companies experience increased uncertainty and complexity, and adopt multi-focused strategies, IT governance designs are more hybrid with increased coordination needs. A federal configuration for IT governance by itself is not related to improved IT performance. IT performance effectiveness is associated with both hybrid configuration and complex integration mechanisms. The implications for research and practice are discussed.

Keywords: IS centralization, IS integration, IS performance, organizational design, case study, financial services

1. INTRODUCTION

Ever since information technology (IT) proved to be more than an administrative tool, researchers and practitioners have pondered its governance. Defined as the locus of IT decision-making authority (Brown 1997; Sambamurthy and Zmud 1999), discussions concerning IT governance have flourished for more than three decades across research communities and boardrooms. Posed as a question of centralization during the 1970s, IT governance drifted toward decentralization in the 1980s, and the recentralization of IT was a 1990s trend. As the network economy dawns, evidence suggests that decentralized IT management is, once more, leading IT-based business innovation (Dalton 1999; Herman 1999). IT governance is experiencing indeed yet another redesign, and persists as a complex and evolving phenomenon. As business environments continuously change and new technologies evolve rapidly, how to govern IT for sustained innovation remains an enduring and challenging question (Brown 1997; Feeny and Willcocks 2000; Markus 2000; Sambamurthy and Zmud 1999).

Traditionally, three configurations have been distinguished for IT governance (Sambamurthy and Zmud 1999). In each configuration, stakeholder constituencies take different lead roles and responsibilities for IT decision making. In the *centralized* configuration, corporate IT management has IT decision-making authority concerning infrastructure, applications, and development. In the *decentralized* configuration, division IT management and business-unit management have authority for infrastructure, applications, and development. In the *federal* configuration (a hybrid configuration of centralization and decentralization), corporate IT has authority over infrastructure, and division IT and business-units have authority over

applications and development. In general, it is argued that centralization provides greater efficiency and standardization, while decentralization improves business ownership and responsiveness (Brown 1997). The literature suggests that the federal configuration provides the benefits of both centralization and decentralization (Hodgkinson 1996; Von Simson 1990), and research indicates that organizations adopt a federal configuration when pursuing multiple competing objectives (Brown and Magill 1998; Sambamurthy and Zmud 1999).

Yet, while the federal configuration seems to be the dominant model in contemporary firms (Hodgkinson 1996; Sambamurthy and Zmud 1999), empirical studies regarding the complexity of this hybrid configuration are sparse. Specifically, formal allocation of IT decision-making authority does not resolve the need for effective coordination between corporate IT, division IT and business-unit management. While literature describes the prevailing arrangements for IT decision-making authority, prior research has not assessed (1) the variety of hybrid configurations, (2) the required integration mechanisms, or (3) the IT performance-related impacts (Brown 1999; Peterson 1998; Sambamurthy and Zmud 1999). Questions remain as to what integration mechanisms are associated with hybrid configurations for IT governance and how IT governance mechanisms relate to IT performance effectiveness. More specifically:

> *What are the hybrid configurations and integration mechanisms for IT governance, and how are designs for hybrid IT governance associated with IT performance?*

Unlike previous studies, this study takes a more holistic approach by examining the range of hybrid configurations, the reach of integration mechanisms, and the level of IT performance effectiveness from a multi-stakeholder perspective. The aim is to advance the conceptualization of IT governance beyond traditional context-design questions. The next sections describe the theoretical foundations (section 2), the research framework (section 3), and the research methodology (section 4). The case study descriptions and analyses are discussed in sections 5 and 6. This paper concludes with a discussion of the contributions and implications for research and practice (section 7).

2. THEORETICAL FOUNDATIONS

Organization design involves two complementary processes: the division of responsibilities for various tasks to be performed, and the coordination of these tasks to realize the activities and the organizational objectives (Daft 1998; Mintzberg 1979; Thompson 1967). To date, the dilemma of organization remains how to design and manage both differentiation and integration (Nadler and Tushman 1998; Venkatraman 2000). In developing a contingency theory of organization, Lawrence and Lorsch (1967) introduced the basic concepts of *differentiation* and *integration.* As organizations interact with their external environment, they differentiate and develop specialized units that deal with sub-environments. Besides the formal division of labor, subunits develop different frames of reference and belief systems (Donaldson and Lorsch 1983; Dougherty 1992; Lawrence and Lorsch 1967; Schein 1996).

In order to achieve unity of effort, differentiation requires integration for achieving organizational objectives. The underlying axiom is a match between coordination needs and a coordination capability is a strong determinant of performance (Daft 1998; Galbraith 1994). A system can only regulate its state if it has a variety of control measures that matches the variety of possible disturbances (Ashby 1956). The literature indicates that in competitive environments, performance effectiveness is characterized by highly differentiated and highly integrated systems (Hitt et al. 1993; John and Rue 1991; Kahn and McDonough 1997; Lawrence and Lorsch 1967; Nadler and Tushman 1998; Powell 1992).

Consequently, in a complex and uncertain environment, IT governance is likely to adopt a differentiated design, i.e., a hybrid configuration. Hybrid configurations vary with the degree of selective vertical and horizontal decentralization of decision-making responsibilities (Mintzberg 1979). Selectively allocating decision-making authority for the three IT decision domains across stakeholder constituencies reveals eight hybrid patterns of increasing differentiation (Table 1).

To realize the benefits of IT governance however, hybrid configurations require suitable integration mechanisms. Mechanisms for integration describe structural, non-structural, and formal and informal means of coordination. Coordination is defined as the timely and purposeful adjustment of decisions pertaining to values of different aspects, between stakeholders involved in decision making (Malone and Crowston 1994; Ribbers 1980). For hybrid configurations, in a complex and uncertain environment, lateral coordination across hierarchies and between stakeholder constituencies is the focal concern (Daft 1998; Galbraith 1994). Mechanisms for integration are categorized as:

Table 1. Hybrid Configurations for IT Governance

Configuration IT decisions	1 Low hybrid	2	3	4	5	6	7	8 High hybrid
Infrastructure	CIT	CIT	CIT	CIT	CIT	CIT	CIT	CIT
Applications	DIT	CIT	DIT	BM	CIT	BM	DIT	BM
Development	CIT	DIT	DIT	CIT	BM	DIT	BM	BM

CIT (Corporate IT Management), DIT (Division IT Management), BM (Business-unit Management)

- *Structural integration* mechanisms for IT governance describe formal integration structures and staff-skill professionalization. Formal structural mechanisms range, with increasing complexity and capability, from direct supervision, liaison roles, task forces, and temporary teams, to full-time integrating roles and cross-functional units and committees for IT (Blanton et al. 1992; Brown 1999; Daft 1998; DeSanctis and Jackson 1994; Galbraith 1973; Lawrence and Lorsch 1967; Mintzberg; 1979; Nadler and Tushman 1998). Informal structural mechanisms are unplanned and cooperative activities that support coordination and the building of network relationships. Under complex and dynamic conditions, informal structural mechanisms support formal structural integration (Mintzberg 1979).

- *Functional integration* mechanisms refer to the system of IT decision-making and communication processes (Luftman and Brier 1999). The system of IT decision-making varies with levels of comprehensiveness, i.e., degree to which activities are systematically and exhaustively addressed, and levels of formalization, i.e., degree to which IT decision-making follows specified rules and standard procedures (Sambamurthy et al. 1993). The system of communication describes informal lateral communication and mutual adjustments among stakeholders (Galbraith 1973; Mintzberg 1979). Similar to informal structural mechanisms, the system of communication supports the formal system of IT decision-making, especially in complex and dynamic environments (Mintzberg 1979).

- *Social integration* mechanisms describe the active participation of key stakeholders in IT decision making and the shared understanding between stakeholders (Reich and Benbasat 1996; Sambamurthy et al. 1994). Complex systems, characterized by distributed decision-making, require active participation and shared understanding among stakeholders if they are to coordinate activities and adapt to changing circumstances. This involves socialization and the development of shared beliefs (Nonaka and Takeuchi 1995), and addresses convergence in frames of reference (Orlikowski and Gash 1994). Social integration is a rich and dynamic mechanism for integration (Weick and Roberts 1993), and involves high levels of mutual understanding of business IT objectives and plans by key stakeholders (Reich and Benbasat 1996).

In general, as the need for coordination increases, a mix of interrelated integration mechanisms will be used (Mintzberg 1979). DeSanctis and Jackson (1994), Malone and Crowston (1994) and Zmud (1984) describe the structural, functional, and social mechanisms as a layered coordination system, with increasing complexity at the lower layers (Table 2). Within each layer, integration mechanisms also differ in level of complexity. Applying the notions of reach and range (Keen 1991), integration mechanisms can differ in range (i.e., structural, functional, and social) and in reach (i.e., complexity) Overall, the integration capabilities of mechanisms increases downward through the layers, from formal-structural mechanisms to social-network mechanisms.

3. TOWARD A THEORETICAL FRAMEWORK

Rooted in a contingency theory of organization, the IS literature suggests "context-design" relationships between the strategic context, hybrid configurations, and integration mechanisms; and "design-outcome" relationships between hybrid configurations, integration mechanisms, and IT performance outcomes (Figure 1). With regard to context-design relationships, the strategic context, conceptualized as the strategic orientation of business and IT (Brown and Magill 1998; Weill and Broadbent 1998), influences the design of hybrid configurations and integration mechanisms. The strategic context fluctuates with levels of complexity (i.e., multiple competing objectives) and levels of uncertainty (i.e., customer-orientation and innovation).

Table 2. Range and Reach of Integration Mechanisms for IT Governance

Mechanisms		Formal Organization	Network Relationships
Structural integration	Upper layer	**Integration Structures** Planned formal integration: – direct supervision/hierarchy – liaison role – task force and teams – integrating role (full-time) – cross-functional units and committees (full-time)	**Staff-Skill Professionalization** Indirect informal integration: – Colocation (physical working arrangements) – Cross-functional rotation (job-rotation) – Cross-functional events (training) – Performance reviews and rewards (incentives)
Functional integration	Increasing integration capability	**System of IT Decision Making** Define, prioritize, select and review IT decisions: – comprehensiveness of IT decision-making (systematic, exhaustive) – formalization of IT decision-making (formal rules and standard procedures)	**System of Communication** Informal communication between stakeholders: – strategic dialogue (critical inquiry) – intensity (ad-hoc, regular) – direction (vertical, horizontal) – media (personal, written, electronic)
Social Integration	Lower layer	**Stakeholder Participation** Active participation by key stakeholders in IT decision-making: – Corporate Executive Management – Corporate IT Management – Business-unit Management – Division IT Management	**Stakeholder Understanding** Shared understanding of business-IT objectives and plans between: – Corporate Executive Management – Corporate IT Management – Business-unit Management – Division IT Management

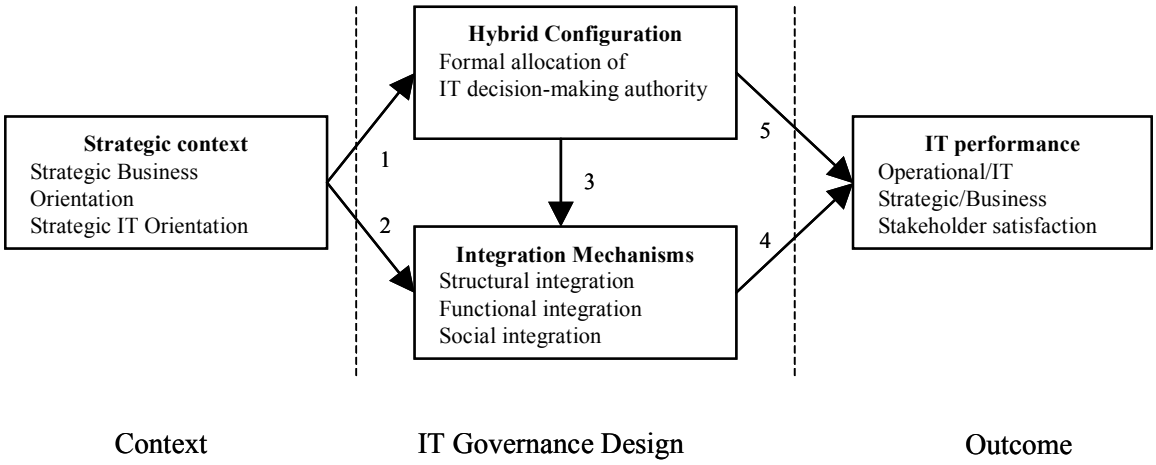

Figure 1. Theoretical Framework and Propositions

In competitive environments, organizations adopt multi-focused strategies (i.e., cost and customer focus) with value-added business models for operational excellence, product leadership, or customer value (Treacy and Wiersema 1995). Similarly, the strategic IT orientation can focus on efficiency and flexibility-objectives (Allen and Boynton 1991) with evolving orientations from exploitation to innovation (Sambamurthy et al. 1994; Scott Morton 1991; Weill and Broadbent 1998). An innovation-orientation is characterized by greater risks and uncertainties (Brown and Magill 1998; Daft 1998). The foregoing leads to the following proposition:

Proposition 1: Companies with a strategic context characterized by high complexity (multiple competing objectives) and high uncertainty (innovation-orientation) will adopt a more hybrid IT governance configuration.

Daft (1998) and Galbraith (1994) indicate that organizations focusing on product innovation and customer service require more lateral coordination and adopt complex integration mechanisms. Sambamurthy and Zmud (1999) suggest that IT innovation strategies require the coordinated efforts of business and IT. Feeny et al. (1992), Keen (1993), and Brown and Magill (1998) indicate that IT innovation is associated with relationship building and cross-functional teams between business and IT. This suggests the following proposition:

Proposition 2: Companies with a strategic context characterized by high complexity (multiple competing objectives) and high uncertainty (innovation-orientation) will adopt more complex integration mechanisms.

Lawrence and Lorsch (1967) indicate that, in order to realize organizational performance objectives, higher differentiation requires closer integration for achieving unity of effort. In differentiated and dynamic environments, characterized by reciprocal interdependence within the organization, coordination needs are high (Thompson 1967), and organizations are likely to implement a mix of interrelated integration mechanisms (Mintzberg 1979). Based on Galbraith (1994), Brown (1999) proposes that organizations with a federal IT governance structure are likely to implement complex integration mechanisms. This leads to the following proposition:

Proposition 3: A (more) hybrid configuration for IT governance is associated with (more) complex mechanisms for integration.

Galbraith (1994) argues that with the use of more complex structural integration mechanisms, both the coordination efforts and performance levels will increase. Conversely, Mintzberg (1979) suggests that deficient integration mechanisms lead to performance deterioration. Under complex and uncertain conditions, performance effectiveness is associated with low comprehensiveness and low formalization, and rich strategic dialogue between stakeholder constituencies (Sambamurthy et al. 1993). Studies suggest that active stakeholder participation and involvement is associated with performance improvements and satisfaction (Jarvenpaa and Ives 1991; Wagner 1994). Empirical evidence indicates that shared understanding among business and IT stakeholders is associated with IT performance effectiveness (Broadbent and Weill 1993; Lind and Zmud 1991; Nelson and Cooprider 1996; Orlikowski and Gash 1994; Reich and Benbasat 1996).

IT performance is a multidimensional construct and ranges from internally IT-oriented toward more externally business-oriented measures, conceptualized as (Nelson and Cooprider 1996; Reich and Benbasat 1996; Weill and Broadbent 1998):

- IT operational performance: delivery on time within budget according to specifications;
- IT strategic performance: responsiveness and contribution to achieving business objectives;
- Business operational performance: quality and innovation of business processes, products, and services;
- Business strategic performance: revenue growth, market share, and customer satisfaction.

The foregoing studies suggest:

Proposition 4: High IT performance effectiveness is associated with more complex integration mechanisms, involving:
(4a) more complex formal and informal structural mechanisms;
(4b) high levels of strategic dialogue and rich communication, and low levels of comprehensiveness and formalization;
(4c) high levels of stakeholder participation and shared understanding.
Conversely, low IT performance effectiveness is associated with relatively simple integration mechanisms.

A competing proposition suggests that, regardless of integration mechanisms, a hybrid configuration for IT governance is associated with IT performance effectiveness. Williamson (1996) suggests that in complex environments, organizations in which divisions have autonomous responsibility for operations and corporate management provides strategic control, are associated with performance effectiveness. Likewise, federal IT governance is proposed as the best design in a competitive environment (Allen and Boynton 1991; Rockart et al. 1996; Zmud et al. 1986), in which integration is automatically achieved based on voluntary activities (DeSanctis and Jackson 1994). This suggests a rival proposition:

Proposition 5: IT performance effectiveness is associated with a hybrid configuration for IT governance, regardless of (the complexity of) integration mechanisms.

4. RESEARCH METHODOLOGY

A case research design was chosen in order to develop theoretical propositions and develop a rich understanding of a complex and contemporary phenomenon within its natural setting. Furthermore, due to the lack of a cumulative research base, the potential terminological ambiguity, and the sensitive nature of the data, a case study research design was deemed appropriate (Benbasat et al. 1989; Broadbent and Weill 1993; Darke et al. 1998). The specific research design is a multiple comparative case study (Yin 1994), and follows the approach proposed by Eisenhardt (1989) for theory-building from case study research. The theoretical framework is used as an initial reference model in conducting the case studies. This study is exploratory in nature and aims at analytical generalization, not statistical generalization (Yin 1994). Consistent with suggestions by Benbasat et al. (1989), Chan and Huff (1992), and Weill and Olson (1989), a theoretical-sampling logic was applied in the selection of case studies (Table 3).

Table 3. Selection of Case Studies

Industry	Environment	Size	Organization	Structure	IT Function	Stakeholders
Financial Services; Insurance + Banking	Complex, dynamic, information-intensive	> 2500 staff > 80 billion in assets	Established brick-and-mortar; No "dot-com" company	Multiple divisions; decentralised profit responsibility	In-house IT; Hybrid structure; > 5% IT investments/ revenues	At least 5 years with the company

Six companies were selected in the Dutch financial services industry. Five large financial conglomerates, active in both insurance and banking, dominate the current market in the Netherlands. The case studies were conducted within this sample of large financial service providers. All companies are large (over 2,500 staff), multi-divisional (at least three divisions), established organization (no dot-com), with in-house responsibilities for IT. The financial services industry in the Netherlands has experienced significant changes in recent years. Besides deregulation, consolidation, and internationalization, commercialization, customization, and IT are regarded as strategic developments. All companies invest over 5% of revenues in IT.

Multiple methods were utilized for data collection. Given the sensitive nature of the data, confidentiality and anonymity were assured. Following the theoretical constructs and coding schemes (Appendix A), a structured interview protocol was developed and pilot-tested in an insurance company. Besides pre-specified items, the interview protocol also included exploratory questions covering contextual and historical developments. On-site interviews were conducted with corporate and division stakeholders, representing business and IT management (Table 4). Each interview lasted approximately two hours and was tape-recorded. Besides interviews, internal documents and external reports were collected, covering the period 1996 through 1999. Internal documents included executive memo's, business plans, IT plans, IT investment procedures, and project manuals and IT audits. External reports included annual reports, organization charts, and business trade reports. Data was stored in a case study database. The combination of multiple data sources and data collection methods allowed for triangulation and the assessment of convergent validity (Yin 1994).

Table 4. Case Studies and Stakeholder Interviews

Company	Sector	Corporate Interviews	IT Interviews	Business-unit Interviews
A	Insurance	2 (CEO, CFO)	2 (IT Director, IT managers)	3 (Business Managers)
B	Insurance	2 (CEO, CIO)	3 (IT managers)	2 (Business Managers)
C	Insurance	2 (CEO, CIO)	2 (IT managers)	3 (Business Managers)
D	Insurance	2 (CEO, CFO)	2 (IT director, IT manager)	2 (Business Managers)
E	Insurance	2 (CEO, CFO)	2 (IT director, IT manager)	2 (Business Managers)
F	Banking	2 (CEO CIO)	3 (IT managers)	2 (Business Managers)

The data collection process was undertaken over an 18 month period (1998-1999), and was divided into four phases: (1) on-site interviews and document collection, (2) feedback on interview reports, (3) confirmation of case report, and (4) company presentation and discussion of research findings. Based on interviews and documents, detailed case descriptions were reported to participants, requesting feedback. From a case study methodology perspective, the use of a theoretically-grounded framework, a structured (pilot-tested) interview protocol, multiple key informants, multiple data sources, and a case study database improve content, construct validity, and reliability (Easterby-Smith et al. 1991; Eisenhardt 1989; Yin 1994).

Data analysis consisted of within- and cross-case analysis through coding and pattern-matching techniques, and was designed to meet internal validity requirements (Eisenhardt 1989; Miles and Huberman 1984; Yin 1994). Each case was coded and categorized, thereby providing an "IT governance profile" for each case. Based on the profile and following the theoretical framework, the level of support for each of the propositions was assessed. Case-specific patterns were identified and recorded in the database. This process was replicated for each case study and the results communicated to the individual participants, upon which feedback was provided. Following the theoretical framework and the case coding, patterns of similarities and differences were analyzed across cases. Clusters of paired cases were identified. Within and across clusters, similarities and differences were identified. The findings were analyzed against the explanations offered by the theoretical framework and underlying propositions. The case studies are described and analyzed in the following sections.

5. CASE STUDIES IN FINANCIAL SERVICES

This section presents the case studies in the Financial Services Industry (Table 5). A more detailed description is provided in Appendix B.

Analyses reveal three clusters of paired cases (Table 6). Each cluster is characterized by an IT governance profile, containing distinct features based on the level of IT performance effectiveness and range and reach of hybrid configurations and integration mechanisms (see section 2).

Table 5. Case Studies in Financial Services

Company A is a full line insurance provider of life and non-life products, and utilizes banking channels, the Internet and call centers as its main distribution channels.
Company B is an internationally and domestically operating insurance company, providing life and non-life insurance products. It distributes its products through a network of independent intermediaries.
Company C is a life and non-life insurer, and utilizes a network of tied agents for the distribution of its products. Insurance products and services are sold from its internal offices through its own sales force.
Company D offers a full range of personal and commercial insurance products through a bank branch network and call center. Company D acts as insurer and authorised underwriting agent, and covers both life and non-life products.
Company E is a complete insurance provider of life and non-life products, and utilizes banking channels and call centers as its main distribution channels.
Company F is an internationally and domestically operating financial service organization, and provides both banking and insurance products through its network of branch offices, the Internet and call centers.

Table 6. Case Studies: IT Governance Profiles

Case	Strategic Context	Hybrid Configuration	Integration Mechanisms	IT Performance
A	Strategic Business Orientation: Cost leadership, product innovation, customer value Strategic IT Orientation: Efficiency, flexibility and innovation	Infrastructure: CIT Applications: BM (+DIT) Development: BM (+CIT)	Structural: complex, formal, business-IT professionalization Functional: comprehensive, formalized, rich strategic dialogue Social: active all-round involvement, shared understanding	Operational: High Strategic: High Satisfaction: High
F	Strategic Business Orientation: Cost leadership, product innovation, customer value Strategic IT Orientation: Efficiency, flexibility and innovation	Infrastructure: CIT Applications: BM (+DIT) Development: BM (+CIT)	Structural: high complexity, formal and business-IT professionalization Functional: comprehensive, formalized, rich strategic dialogue Social: active all-round involvement, high shared understanding	Operational: High Strategic: High Satisfaction: High
D	Strategic Business Orientation: Cost leadership and product innovation Strategic IT Orientation: Efficiency, flexibility and innovation	Infrastructure: CIT Applications: DIT Development: BM (+CIT)	Structural: complex, formal, IT professionalization Functional: comprehensive, formalized, vertical Social: active involvement, low shared understanding	Operational: High Strategic: Moderate Satisfaction: Moderate
E	Strategic Business Orientation: Cost leadership and product innovation Strategic IT Orientation: Efficiency, flexibility and innovation	Infrastructure: CIT Applications: BM Development: DIT (+CIT)	Structural: complex, formal, IT professionalization Functional: ad-hoc, informal, horizontal Social: active involvement, low shared understanding	Operational: High Strategic: Moderate Satisfaction: Moderate
B	Strategic Business Orientation: Cost leadership and product innovation Strategic IT Orientation: Efficiency, flexibility and exploitation	Infrastructure: CIT Applications: DIT Development: DIT (+CIT)	Structural: complex, formal, IT professionalization Functional: ad-hoc, informal, vertical Social: IT participation, political conflicts and growing distrust between business and IT managers	Operational: Low Strategic: Low Satisfaction: Low
C	Strategic Business Orientation: Cost leadership and product innovation Strategic IT Orientation: Efficiency, flexibility and exploitation	Infrastructure: CIT Applications: DIT Development: DIT (+CIT)	Structural: complex, formal, IT professionalization Functional: ad-hoc, informal, vertical Social: IT participation, political conflicts and growing distrust between business and IT managers	Operational: Low Strategic: Low Satisfaction: Low

High IT performance (A and F) is associated with high reach integration, high range hybrid and multiple strategic orientations, with dominant value propositions for customer value and an IT innovation orientation. More specifically, integration mechanisms are characterized by complex formal and informal structural mechanisms, comprehensive formal and informal functional mechanisms, and high levels of social integration.

Moderate IT performance (D and E) is associated with low reach integration, high range hybrid and multiple strategic orientations, with dominant value propositions for product innovation and an IT innovation orientation. Mechanisms for integration are characterized by complex formal structural mechanisms, comprehensive formal functional mechanisms, and high levels of active participation.

Low IT performance (B and C) is characterized by low reach integration, low range hybrid and multiple strategic orientations, with dominant value propositions for operational excellence and an IT exploitation orientation. More specifically, integration mechanisms are characterized by complex formal structural mechanisms, IT professionalization and participation, ad-hoc vertical functional integration, and political conflicts and growing distrust between business and IT management. All cases are characterized by complex *formal-structural* integration mechanisms.

All cases and clusters of cases are characterized by a complex strategic context, i.e., multiple strategic orientations of business and IT, and a hybrid configuration for IT governance. The strategic contexts differ, however, in orientation. Cases A and F and Cases D and E are characterized by market and innovation oriented strategies, while Cases B and C are characterized by cost and exploitation oriented strategies.

Following the main thesis that, in complex and uncertain environments, effective IT governance requires coexisting, highly differentiated, and highly integrated systems, the relationships between hybrid configurations, integration mechanisms, and performance effectiveness are graphically displayed in Figure 2. The findings indicate that high IT performance in complex and uncertain environments is characterized by both high hybrid configurations and complex integration mechanisms for IT governance. Deficient integration mechanisms (Cases B and C) are associated with lack of responsiveness, lack of efficiency, and lack of perceived business value.

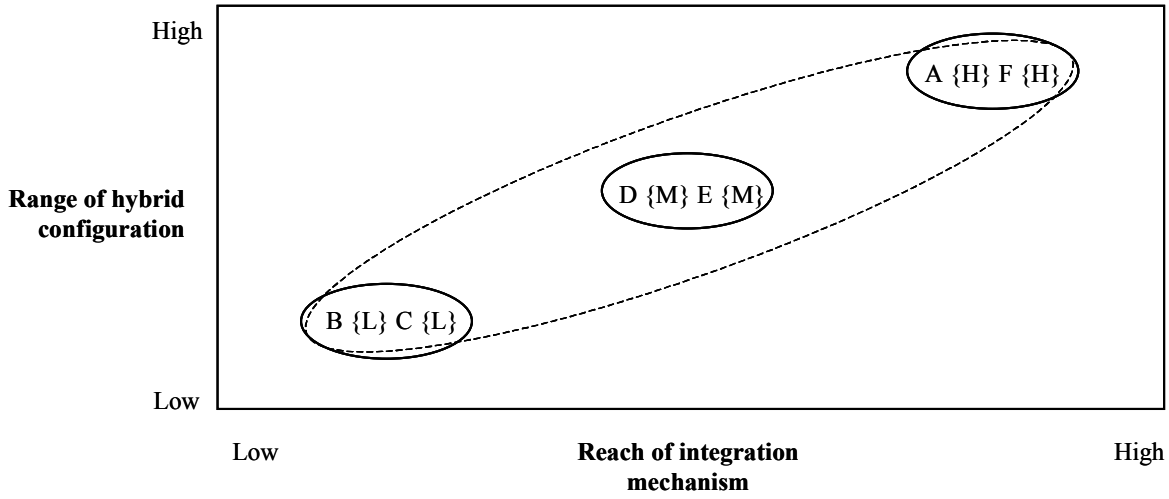

Figure 2. Hybrid Configurations, Integration Mechanisms and Performance Effectiveness

With regard to the "high IT performance" cases (A and F), different integration mechanisms are adopted. Differences in integration mechanisms are, however, primarily of the *formal-structural* type, e.g., Company F has a CIO, while in Company A the executive board shares the responsibility for IT at the corporate level. Company F has a "steering office" for quality control, and Company A rotates IT managers between divisions. IT managers also have a vice president role in divisions. Furthermore, in comparison to other the other cases, companies A and F share high-level *social-network* integration mechanisms, characterized by active multi-stakeholder participation, IT-competent business managers, rich strategic dialogues (e.g., informal lateral communication and scenario-building activities), and high levels of shared understanding between key stakeholders.

6. DISCUSSION OF THEORETICAL FRAMEWORK AND PROPOSITIONS

With regard to the proposed theoretical framework, and consistent with previous studies, propositions 1, 2, and 3 are supported by all cases (Table 7). More specifically, a strategic context characterized by multiple competing objectives for business and IT is associated with the adoption of a hybrid configuration. Companies A and F, pursuing a market-based, customer-focused, IT innovation strategy are characterized by more complex hybrid configuration for IT governance, and more complex mechanisms for integration. Companies B and C, pursuing an operations-focused, IT exploitation strategy have a less complex hybrid design. As organizations face an increasingly complex and uncertain environment, they adopt higher levels of IT governance differentiation, consequently requiring closer integration, in order to achieve IT performance effectiveness.

Table 7. Support for Theoretical Framework and Propositions

Prop.	**1**	**2**	**3**	**4a**	**4b**	**4c**	**5**
A	Support	Support	Support	Support	No support: Comprehensive	Support	Support
B	No support: Inverse support for uncertainty	No support Simple mechanisms; Inverse support	No support: Simple mechanisms	Support: Inverse	Support: Inverse	Support: Inverse	No support: Low performance
C	No Support: Inverse support for uncertainty	No Support: Simple mechanisms; Inverse support	No Support Simple mechanisms	Support: Inverse	Support: Inverse	Support: Inverse	No support: Low performance
D	Support	Support	Support	Support	No support: Moderate performance, comprehensive	No Support: Moderate performance, Active involvement	No support: Moderate performance
E	Support	Support	Support	Support	No Support: Moderate performance, Rich dialogue	Support:	No Support: Moderate performance
F	Support	Support	Support	Support	No Support: Comprehensive	Support	Support
Support	YES	YES	YES	YES	NO	YES	NO
LITERATURE	Brown and Magill 1994, 1997; Daft 1998; Galbraith 1973, 1994; Lawrence and Lorsch 1967; Sambamurthy and Zmud 1999; Weill and Broadbent 1998	Brown and Magill 1994, 1997; Daft 1998; Feeny et al. 1992; Galbraith 1973, 1994; Keen 1991, 1993; Lawrence and Lorsch 1967, Sambamurthy and Zmud 1999	Brown 1997; Brown and Magill 1994, 1997; Daft 1998; DeSanctis and Jackson 1994; Dixon and John 1989; Lawrence and Lorsch 1967; Mintzberg 1979; Thompson 1967	Daft 1998; DeSanctis and Jackson 1994; Galbraith 1973, 1994; Lawrence and Lorsch 1967; Mintzberg 1979; Weill and Broadbent 1998	Henderson and Lentz 1994; Nadler and Tushman 1998; Nonaka and Takeuchi 1995; Weill and Broadbent 1998	Broadbent and Weill 1993; Nelson and Cooprider 1996; Orlikowski and Gash 1994; Reich and Benbasat 1996	Daft 1998; Lawrence and Lorsch 1967; Mintzberg 1979

Analyses indicate that closer, more complex integration is associated with social-network coordination mechanisms. The findings suggest that a social perspective provides an important paradigm for understanding and explaining effective designs for IT governance. In complex, uncertain, and dynamic environments, the case findings reveal that effective coordination is characterized by social systems, rather than formal bureaucratic structures.

With regard to proposition 4, the findings support propositions 4a and 4c, i.e., complex structural and social integration mechanisms are associated with IT performance effectiveness. However, all cases where characterized by complex structural mechanisms, and social-network mechanisms play a focal role in complex and dynamic environments. Effective IT governance in the case studies is characterized by lateral organic coordination mechanisms.

Proposition 4b suggested that in a complex and uncertain environment, IT performance effectiveness would be associated with low comprehensiveness and low formalization. This proposition was not supported, as moderate-high IT performance was also associated with comprehensive IT decision making. The findings indicate that both comprehensive IT decision making and lateral communication are required to develop the necessary functional integration capabilities. These mechanisms describe the explicit means through which stakeholders systematically influence IT decision making, learn from their performance, and develop a shared understanding. This involves internalizing and externalizing information and knowledge.

The results indicate that federal IT governance alone is not related to IT performance effectiveness (Proposition 5). Merely establishing a federal structure, without adequate attention for integration mechanisms is unlikely to lead to improved performance. Federal IT governance is a high-risk structure; its efficacy depends largely upon social-network integration mechanisms. The case findings indicate that a hybrid structure without suitable coordination is associated with a dysfunctional organization and low IT performance effectiveness.

7. CONCLUSIONS AND FUTURE RESEARCH

Our research objective was to enrich and expand the conceptualization of IT governance by identifying the complexity of hybrid configurations and integration mechanisms for IT governance, and to examine the effects on IT performance. The main research questions were: (1) what types of hybrid configurations and integration mechanisms are used for IT governance and (2) how does a hybrid IT governance design affect IT performance? While previous studies have focused on the context and design of IT decision-making authority structures, our research extends the traditional conceptualization of IT governance by examining the range of hybrid configurations, the reach of integration mechanisms, and the IT performance impacts.

With regard to the range of hybrid IT governance arrangements, the research indicates that companies adopt several types of federal arrangements for IT governance, depending on the strategic orientation of business and IT. Strategic orientations with a focus on innovation are associated with a hybrid configuration in which business management plays a pivotal role. As the financial services industry becomes more competitive, companies focus on both operational excellence and product-service innovation. The complexity and uncertainty associated with these competing pressures increase the division of IT decision-making authority, thus creating differentiated designs for IT governance.

The research suggests that IT governance is not solely concerned with the formal allocation of IT decision-making authority. Irrespective of the locus of control, mechanisms for lateral coordination need to be included for the governance of IT. The findings indicate that, in competitive environments, effective IT governance is more likely to resemble a network of relationships rather than classical hierarchical structures. While the literature proposes the use of structural devices, we have found that while structural devices are necessary, they are insufficient for developing adequate coordination capabilities in the competitive environment of financial services. Functional and social coordination mechanisms are the differentiating capabilities.

For managers, this study indicates that as IT becomes deeply embedded within the business fabric, they will need to learn to manage both differentiation and integration. The challenging question remains how to manage integration. Traditionally, organizations have resorted to the oversimplified "pendulum swing" of centralization and decentralization. The traditional "centralization vs. decentralization" panacea obscures the real organizational issues that should be managed, i.e., horizontal design mechanisms for IT governance. Furthermore, contrary to recent management trends, this study indicates that sustaining IT-based innovation is too important to be delegated to IT management, without the coordinated efforts and shared understanding of corporate and IT-competent business executives. Business stakeholders—both corporate, division and department managers—need to take responsibility for leading IT-based business innovations. Competence in business, social, and technical skills remains essential for both business and IT management.

The major limitation of this exploratory study is that it does not address external validity. The research findings are drawn from six large organizations in a single industry. Generalization to other types of organizations and industries is, therefore, not possible. The sample size and coding schemes also did not allow for statistical testing of propositions. On the other hand, our aim was to explore and expand the conceptualization of IT governance and not to generalize IT governance practices. Future research should focus on the statistical validation of the theoretical framework and underlying propositions. A survey design across a large, more heterogeneous population would provide important insights as to the external validity of the case study results. Alternatively, a longitudinal study on the dynamics of hybrid configurations and integration mechanisms would provide answers as to how IT governance designs change and transform in different environments. Our research activities are currently focused on the design and effectiveness of coordination mechanisms for IT governance across different industries.

Summarizing the main lessons learned from this study, we conclude that whatever formal configuration is chosen for allocating IT decision-making authority, IT performance effectiveness requires a complex mix of formal and informal integration mechanisms, with salient attention for stakeholders' interests, involvement, and shared understanding. Merely assigning a CIO, steering committees, or e-business coordinators will not resolve integration. IT governance coordination needs to be actively managed, for it will not occur automatically and voluntarily. Recognizing these facts can enable managers to rid themselves from the pendulum swing in order to really move forward. The configurations and mechanisms for IT governance described are a useful map through which organizations can assess their current IT governance position and identify coordination problems. Future research will need to assess what effective coordination mechanisms are being used across industries and geographic boundaries.

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Appendix A. Summary of Theoretical Constructs and Operationalization

Constructs	Dimensions	Operationalization	Source
Strategic business orientation	**Focus**		
– Business strategy	Cost leadership	Operation-oriented, minimize overhead, conformity	Brown and Magill (1994, 1997); Porter (1985); Treacy and Wiersema (1995); Ward and Griffiths (1996); Weill and Broadbent (1998)
	Differentiation	Market-oriented, innovation, seek/create opportunity	
– Value model	Operational excellence	Efficiency, reliability, optimum price-convenience relation, streamline supply chain	
	Product leadership	Product innovation, rapid commercialization, product responsiveness	
	Customer value	Customer service, customer responsiveness, customization, customer relationships	
Strategic IT orientation			
– IT strategy	Exploitation	Stability, control, automation	
	Innovation	Flexibility, transformation, experimentation	
– IT model	Utility	Cost saving via economies of scale, utility service at lowest cost; IT expense	Sambamurthy et al. (1994); Ward and Griffiths (1996); Weill and Broadbent (1998)
	Dependent	Response to current strategy, business benefits; IT expense	
	Enabling	Anticipating current and future business orientation; IT investment	
– IT investments	IT investments IT Development IT Maintenance	% Revenues/% Operational costs % Investments for innovation and new developments % Investments for maintenance and extensions	
IT Governance Configuration	**IT decision authority for:**	Low — Hybrid Configuration — High	
		1 2 3 4 5 6 7 8	Sambamurthy and Zmud (1999); Sambamurthy et al. (1994)
– Hybrid allocation of IT decision-making authority	IT infrastructure/ operations	CIT CIT CIT CIT CIT CIT CIT CIT	
	IT applications/use	CIT DIT DIT CIT BM BM DIT BM	
	IT development/ innovation	DIT CIT DIT BM CIT DIT BM BM	

IT Governance Mechanisms	**Use/extent of**	Low Integration Complexity High	
– Structuralintegration Layer 1–Low reach/ static	Formal Network/Informal	Hierarchy, liaison, teams, integrator, cross-functional units Colocation, cross-functional rotation and training, reviews	Brown (1997, 1999); Daft (1998); DeSanctis and Jackson (1994); Dyson and Foster (1981); Galbraith (1973, 1974); Grover (1998); Lawrence and Lorsch (1967); Malone and Crowston (1994); Nelson and Cooprider (1996); Reich and Benbasat (1996); Sambamurthy et al. (1994); Segars and Wagner (1994); Tushman and Nadler (1978); Zmud (1984)
– Functional integration Layer 2–Moderate reach	Comprehensiveness Critical inquiry	Goal setting, prioritization, selection, evaluation of IT Contacts, communication, negotiation, issue analysis	
– Social integration Layer 3–High reach/dynamic	Active participation Shared understanding	Key stakeholders and degree of active participation in IT decision-making system Level of shared understanding of business and IT objectives between key stakeholders	
IT performance effectiveness	**Objectives** (stakeholder related)	**% achievement and explanation** (Also internal reports)	Boynton et al. (1994); Chan et al. (1997); Daft (1998); Lawrence and Lorsch (1967); Nelson and Cooprider (1996); Sabherwal (1999); Sambamurthy et al. (1994); Weill and Broadbent (1998);
Operational IT Level 1 performance	Availability	Low 0-29 21-40 41-60 61-80 81-100 High	
	Delivery	Low 0-29 21-40 41-60 61-80 81-100 High	
	Functionality	Low 0-29 21-40 41-60 61-80 81-100 High	
Strategic IT Level 2 performance	Responsiveness	Low 0-29 21-40 41-60 61-80 81-100 High	
	Business contribution	Low 0-29 21-40 41-60 61-80 81-100 High	
Operational Business Level 3 performance	Productivity	Low 0-29 21-40 41-60 61-80 81-100 High	
	Efficiency	Low 0-29 21-40 41-60 61-80 81-100 High	
	Time-to-market	Low 0-29 21-40 41-60 61-80 81-100 High	
	Innovation of:	Low 0-29 21-40 41-60 61-80 81-100 High	
	Structures	Low 0-29 21-40 41-60 61-80 81-100 High	
	Processes	Low 0-29 21-40 41-60 61-80 81-100 High	
	Products	Low 0-29 21-40 41-60 61-80 81-100 High	
	Services	Low 0-29 21-40 41-60 61-80 81-100 High	
Strategic Business Level 4 performance	Strategic and financial objectives	(profitability, revenue, market share, customer satisfaction, innovativeness)	
	Av. Revenue growth	As indicated by Annual reports	
	Av. Cost-control	Low 0-29 21-40 41-60 61-80 81-100 High	
	Market share improvement	Low 0-29 21-40 41-60 61-80 81-100 High	
	Customer satisfaction	As indicated by Annual reports, Internal reports	
	Competitive position	As indicated by Annual reports, Industry reports	
IT Governance Stakeholders	**Satisfaction**	**Level of satisfaction: grade**	
	Satisfaction with responsibilities, decision making, communication, participation, collaboration, and IT achievements	Low 0-29 21-40 41-60 61-80 81-100 High Explain grade; examples, illustrations	

Appendix B. Summary of Case Descriptions

Company A aims to be a complete insurance company offering a full-range of insurance products and services to its customers. Its strategic objectives are to exploit multiple distribution channels, including Internet and call centers, and provide added value to customers. IT is regarded as a "life line." Business executives state: "*without IT there is no production, no innovation, no marketing, no added value for customers.*" Continued investments in IT are seen as critical for sustaining a competitive position. The executive board shares responsibility for IT strategy and investments. The corporate IT director is responsible for IT support, IT security and IT infrastructure policy and standards. IT application responsibilities are decentralized to business units. IT developments are lead by business-unit management. Division IT management functions as vice president of the business unit. A steering committee, consisting of CEO, CFO, marketing director, IT director, and division executives, is responsible for prioritizing, selecting, and evaluating IT investments. Scenario discussions are used to identify new developments. Corporate IT provides quality control and administrative support. Multi-disciplinary teams are involved in business development projects. Standard project management tools are used. Regular monthly formal reviews are used to discuss performance issues and resolve conflicts. Rewards are related to IT performance. Business executives are required to achieve an MBA in Information Management. Every two years, IT managers are rotated between divisions, and follow courses on business economics and management. IT performance is formally assessed by looking at targets set for time, budget, functionality, and business improvement. Business improvements mentioned by both business and IT management include improved time-to-market, product innovation, multi-channel distribution, reduced transaction costs, sustained market growth, customer satisfaction. 80% of IT developments meet IT and business performance requirements. IT availability is rated at 99.5% and responsiveness at 90%. Business rates the IT governance system with a 8.5, while IT rates the system with an 8.

Company B aims to be an integrated flexible provider of financial services. Its key driver is operational excellence: staying a low-cost producer of flexible insurance products. IT support for these strategic objectives is diverse. However, business management indicates "*it is unclear whether there is indeed coherent IT support for our business objectives*." A recent memo by the executive board states that IT is not playing its strategic role. The IT organization is lead by an executive board CIO. The corporate IT department is responsible for strategy development, network infrastructure, and managing IT investments. Responsibilities for IT application are decentralized to division IT management. IT developments are lead by division IT management and corporate IT. A program bureau provides administrative support. Relationship managers function as account managers for internal customers. Multi-disciplinary teams are involved in IT projects. Business and IT managers are colocated. Standard project management tools are presumed to be used, but in practice are rarely applied. *Ad hoc* informal reviews are used to discuss performance issues. According to business management: "*we still live in silos; the organization works in a very hierarchical manner and its always the chain of command that needs to be followed*." IT managers are trained in professional project management. IT performance is occasionally assessed for large projects by looking at targets set for time, budget, and functionality. Business improvements mentioned by both business and IT management include productivity and reduced transaction costs. Business management indicates: "*while IT has reduced costs to some extent, the real value for our business and customers, have not improved with the large amount of investments in IT.*" 30% of IT developments meet IT and business performance requirements. IT availability is rated at 80% and responsiveness at 60%. Business rates the IT governance system with a 5, while IT rates the system with a 6. A senior IT management states: "*as IT governors we still need to learn to govern IT effectively.*"

Company C aims to be an full-service provider of flexible personalized financial services. Its key drivers are operational excellence and sales effectiveness. Productivity and streamlining business process are strategic business objectives in response to the rapidly changing marketplace and lagging sales effectiveness in 1997. The role of IT is to support the business in reducing transaction costs and improving efficiency, especially with regard to its distribution channel of tied agents. The IT organization is lead by an executive board CIO. The corporate IT department is responsible for strategy development, network infrastructure, and managing IT investments. IT management indicates that in practice "*its really a matter of who can scream the loudest*." Responsibilities for IT application are decentralized to division IT management. IT developments are lead by division IT management and corporate IT. A recently organized "IT office" acts as a steering committee. Multi-disciplinary teams are involved in IT projects. Business and IT managers are colocated. Standard project management tools have recently been introduced, as well as project management training for IT managers. *Ad hoc* informal reviews are used to discuss performance issues. According to business management: "*there still exists a huge wall between business and IT; success has many fathers, but failure is an orphan, so who would want to be responsible for IT?"* IT performance is occasionally assessed for large projects by looking at targets set for time, budget, and functionality. 20% of IT developments meet IT and business performance requirements. Business improvements mentioned by both business and IT management include productivity and efficiency. Business management adds: "*despite significant investments in IT, we are not experiencing any added value. In fact, IT is more*

of an inhibitor than an enabler." IT availability is rated at 70% and responsiveness at 50%. Business rates the IT governance system with a 3, while IT rates the system with a 5.

Company D aims to improve the effectiveness and efficiency of its distribution channels to cater to the needs of customers. The Internet and call centres are playing a key role in this strategic development. Market image and responsiveness to market developments and customer needs are strategic objectives. IT is focused on the effective delivery of IT products and services, enabling lean business operations and innovative insurance products. The IT organization is led by an IT director reporting directly to the CEO. The corporate IT department is responsible for strategy development, architecture and network operations. Responsibilities for IT application support are decentralized to Division IT management. IT developments are lead by business management. A steering committee, consisting of CEO, IT director, and division executives, is responsible for prioritising, selecting, and evaluating IT investments. An IT program council has a control and oversight function. Relationship managers function as account managers for internal customers. Multi-disciplinary teams are involved in business development projects. Standard project management tools are used. IT managers follow project management training and meet every week with the IT director to discuss new issues and resolve problems. IT performance is formally assessed by looking at targets set for time, budget, functionality, quality, and business improvement. Business improvements mentioned by both business and IT management include product innovation, multi-channel distribution, efficiency improvement, and sustained market growth. 70% of IT developments meet IT and business performance requirements. Business management states: "*I still experience the 'Great Chinese Wall' between business and IT.*" IT availability is rated at 99% and responsiveness at 80%. Business rates the IT governance system with a 6, while IT also rates the system with a 6.5.

Company E aims to be a complete insurance company offering a full-range of insurance products and services to its customers. Its key drivers are flexibility, service quality, multiple distribution channels, including Internet, and improved cost effectiveness. IT support for these strategic objectives is extensive and diverse. There is a strong commitment to invest substantially in innovative IT. The executive board shares responsibility for IT strategy setting. The corporate IT director is responsible for IT strategy development, IT infrastructure policies and architecture standards. IT application responsibilities are decentralized to business units. IT developments are lead by division IT management. A steering committee, consisting of CEO, IT director, and division executives, is responsible for prioritizing, selecting, and evaluating IT investments. However, according to the CFO, "*most IT investments are still made without a clear business case.*" Corporate IT provides administrative support. Multi-disciplinary teams are involved in IT projects, usually managed by local IT management. Standard project management tools are used. *Ad hoc* reviews are used to discuss performance issues. IT managers are trained for professional project management. IT performance is formally assessed by looking at targets set for time, budget, and functionality. Business improvements mentioned by both business and IT management include productivity, product innovation, multi-channel distribution, reduced transaction costs. 60% of IT developments meet IT and business performance requirements. IT availability is rated at 99% and responsiveness at 80%. Business rates the IT governance system with a 6.5, while IT rates the system with a 7.

Company F aims to supply a comprehensive high-quality range of products and services, with a focus on the customer's unique financial situation, wishes, and requirements. According to one business executive: "*we have reached an optimum cost-quality level and a commodity market exists. We need to add customer value through product and service innovation; without IT, this just isn't possible.*" New distribution channels, such as the Internet, are used to cater to the needs of customers. The IT organization is lead by an executive board CIO. The corporate IT department is responsible for strategy development, architecture, and network operations. Responsibilities for IT application support are decentralized to business units. IT developments are lead by business management A steering committee, consisting of CEO, CIO, and division executives, is responsible for prioritizing, selecting, and evaluating IT investments. According to business management: "*Much lobbying goes on to get IT investments through the committee*." Scenario discussions are used to identify new developments. The project office provides quality control and administrative support. Relationship managers function as account managers for internal customers. Multi-disciplinary teams are involved in business development projects. Standard project management tools are used. Regular monthly formal reviews are used to discuss performance and lessons learned and to resolve conflicts. Business executives are required to achieve an MBA in Information Management. Project managers are professionally trained. IT performance is formally assessed by looking at targets set for time, budget, functionality, quality and business improvement. Business improvements mentioned by both business and IT management include efficiency, improved time-to-market, product innovation, multi-channel distribution, sustained market growth, customer satisfaction. Business management states: "*Without IT, these business achievements would not have been possible*." 70% of IT developments meet IT and business performance requirements. IT availability is rated at 99% and responsiveness at 95%. Business rates the IT governance system with a 7.5, while IT rates the system with an 8.